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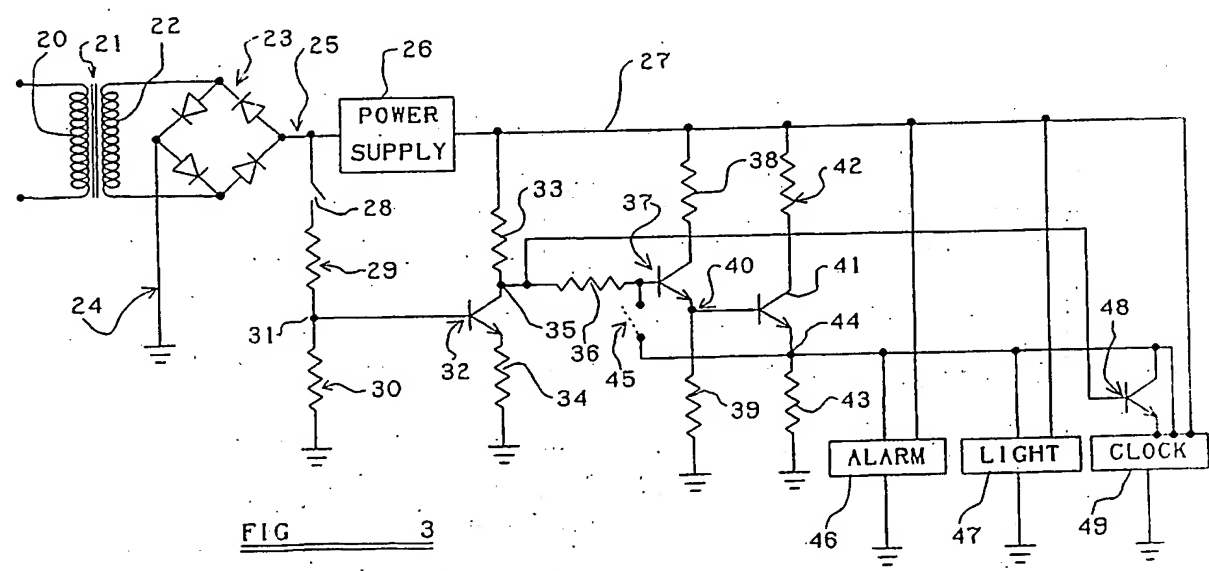
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(54) Power supply alarm with indication of failure duration

(57) An alarm device is adapted to be connected to an electric power supply which provides power for an electric appliance. The alarm comprises means to detect a failure of the mains power supply and to provide an alarm in the event of such failure. The device also has means to provide an indication of the duration of the failure of the power supply. Also disclosed is a supply failure alarm contained in a housing adapted to receive the terminal pins of a plug connected to an electrical appliance and provided with protruding terminal pins adapted to be inserted into a mains socket (i.e. a socket adaptor).



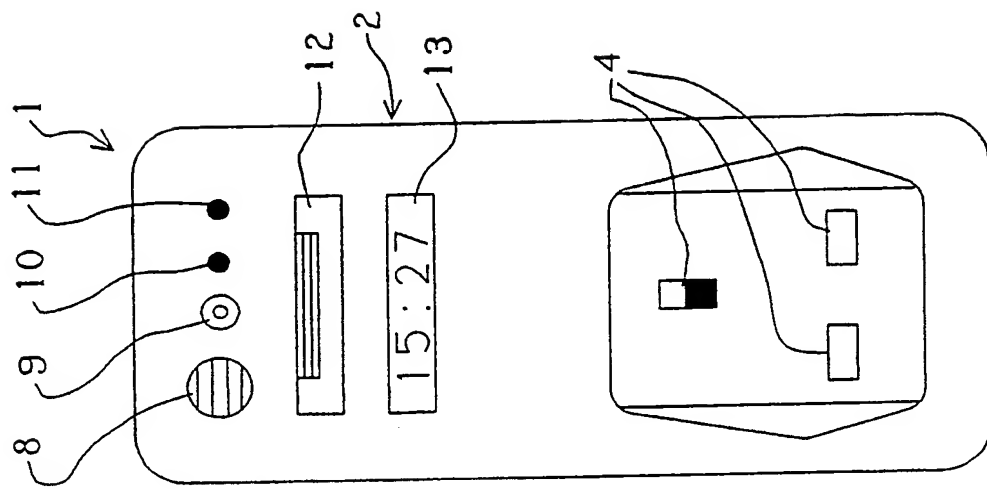


FIG 2

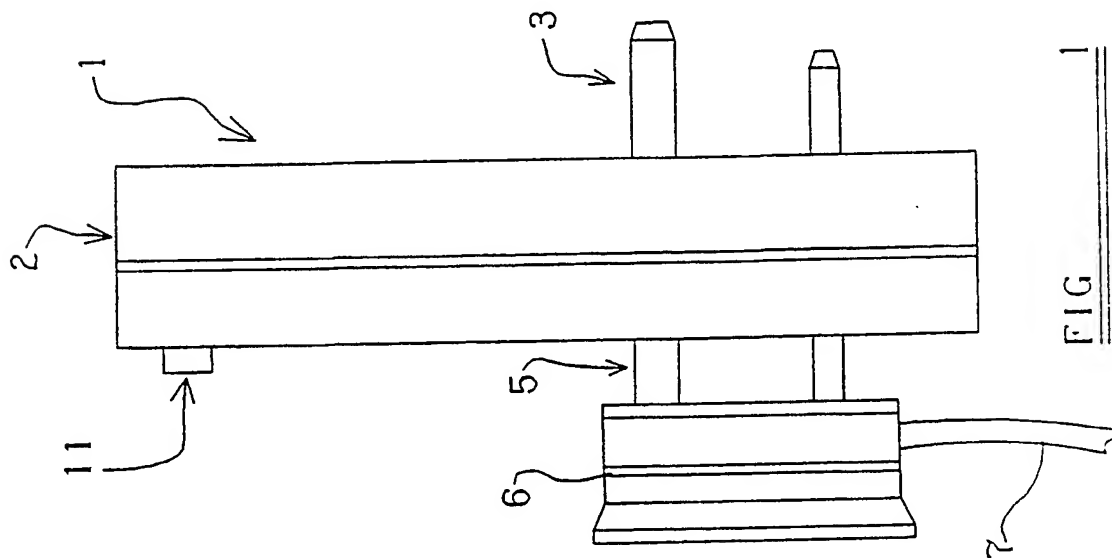


FIG 1

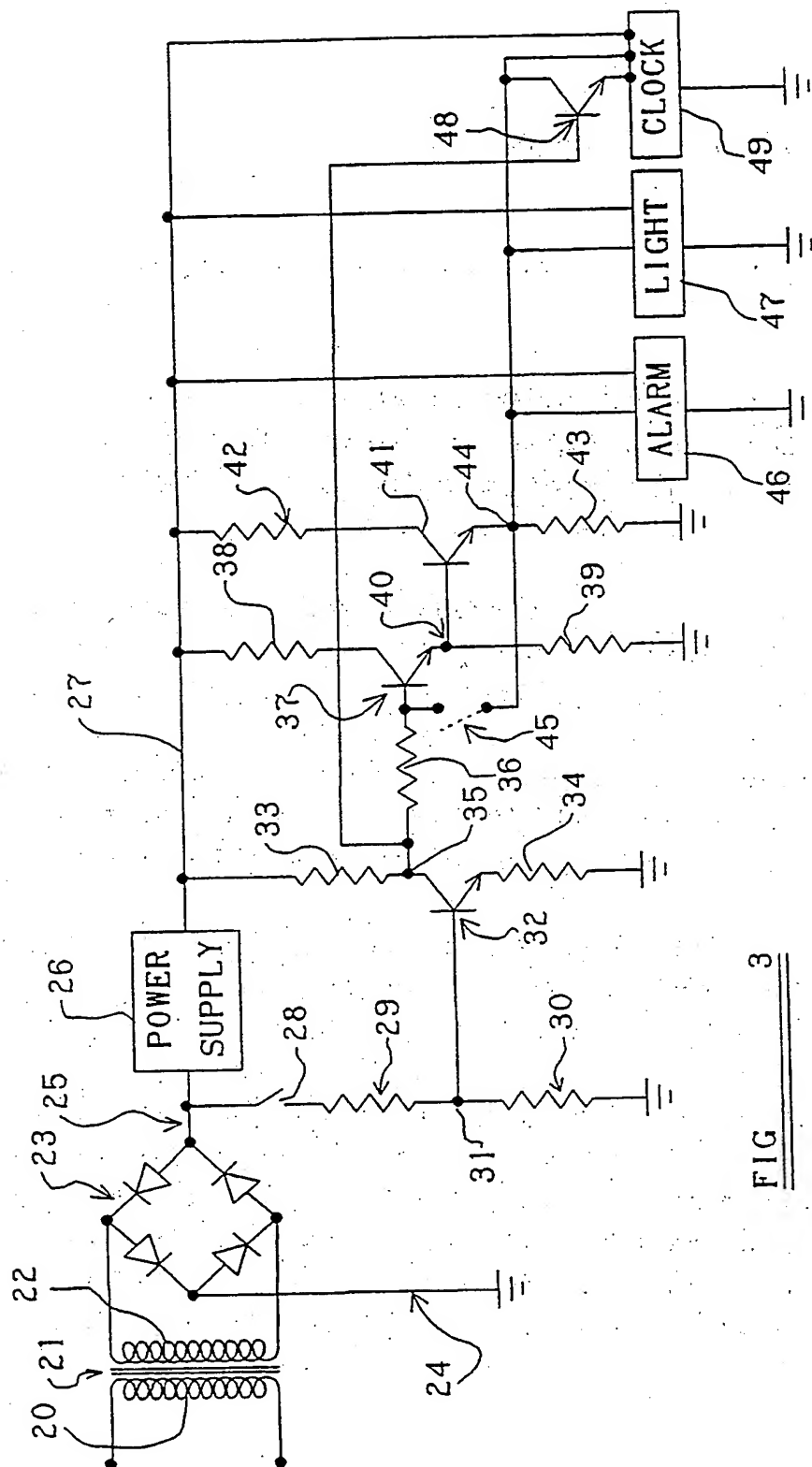


FIG 3

DESCRIPTION OF INVENTION

"Improvements in or relating to an Alarm Device"

THE PRESENT INVENTION relates to an alarm device and more particularly relates to an alarm device adapted to provide an indication when a mains power supply to an electric appliance has been interrupted.

Many electrically powered devices are plugged into electric main supply power sockets. From time-to-time, however, the main electric power supply is interrupted, due to a power cut or a main fuse blowing. It is often desirable for a person to know when the power supply to an appliance has been interrupted, and also for the person to know for how long the power supply has been interrupted.

For example, if the power supply to a deep-freeze is interrupted, if the interruption is only for a brief period of time, the temperature within the deep-freeze will not rise significantly, and thus no harm is done. However, if the power supply to a deep-freeze is interrupted for a considerable period of time, then the contents of the deep-freeze may thaw and the food within the deep-freeze may begin to perish. If the power supply is then restored, the contents of the deep-freeze will be re-frozen. If this chain of events occurs while a person is away from the premises, for example on holiday, then the person may not realise that the food within the deep-freeze has been damaged.

A further situation where a person may wish to know that a power supply has been interrupted, even if for a brief period of time, is where a pre-programmed device, such as a video recorder, is in use. In many cases, the "programming" present on the device is totally lost even if the power supply is only interrupted briefly.

The present invention seeks to provide an alarm device adapted to provide an indication when the power supply to an electric appliance has been interrupted.

According to one aspect of this invention there is provided an alarm device, the device being adapted to be connected to an electric power supply providing power for an electric appliance, the alarm device comprising means to detect a failure of the mains power supply, and means to provide an alarm in the event of the failure of the power supply and means adapted to provide an indication of the duration of the failure of the power supply.

According to another aspect of this invention there is provided an alarm device, the alarm device comprising a housing, the housing being provided with protruding terminal pins adapted to be inserted into a main electric supply socket, the housing presenting apertures adapted to receive the terminal pins of a plug connected to an electric appliance, the arrangement being such that when the housing has the terminal pins thereof inserted into a mains electric socket and a plug connected to an electric appliance has the terminal pins thereof inserted in the apertures in the housing, the appliance is connected to the mains electric supply, the housing containing means adapted to respond to the failure of the mains electric supply to activate an alarm present within the housing.

The alarm may comprise an audible alarm or a visible alarm such as a flashing light, and the alarm may include means adapted to provide a display of the time for which the power supply has been interrupted.

Preferably a re-set button is provided adapted to terminate operation of the alarm and/or to re-set the time display.

Preferably the housing contains a battery adapted to provide power for the alarm and the time display, and the battery may be rechargeable directly from the mains supply.

Preferably means are provided to test the operation of the alarm by simulating a power failure.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which

FIGURE 1 is a side view of an alarm device in accordance with the invention showing the lead and plug of an electric appliance to be connected to the alarm device,

FIGURE 2 is a front view of the alarm device of Figure 1 showing the operative features thereof, and

FIGURE 3 is a circuit diagram of the electric arrangement within the alarm device.

Referring to the drawings an alarm device 1 in accordance with the invention is in the form of a rigid housing 2 carrying, on its rear face, protruding terminal pins 3 of a conventional form to be received within an electric mains supply socket. In the drawings the terminal pins are illustrated as the conventional "rectangular" pins presently used in the United Kingdom, but it is to be appreciated that any other conventional format of terminal pins may be used. The housing 2 presents, on its front face, a plurality of apertures 4 adapted to receive the terminal pins 5 of a plug 6 connected to a lead 7 extending to an electric appliance. The terminal pins 5 of the plug 6 will be in direct electrical terminal with the pins 3 present on the housing 1. However, the contact pins 3 present on the housing 1 will also be connected to electric circuitry as will be described hereinafter with reference to Figure 3.

The front face of the housing 2, as can be seen most clearly from Figure 2, is provided with various features comprising a grille 8 located adjacent a transducer mounted within the housing, adapted to provide an audible alarm. The housing is also provided with an aperture or a transparent portion 9 through which a light, such as a light-emitting diode, can be seen from the exterior of the housing. The housing is also provided with two press-buttons, comprising a test button 10 and a re-set button 11. The front of the housing is also provided with a small removable cover 12 which can provide access to a cavity within the housing 2 dimensioned to receive one or more long life batteries. As will be described, it is preferred that the batteries are of the re-chargeable type.

The front face of the clock also carries a liquid crystal display 13 adapted to provide an indication of elapsed time in hours and minutes.

It is envisaged that the described alarm device may be plugged into a conventional electric mains supply socket, with the terminal pins 3 being inserted into the socket. A plug 6 may have the terminal pins 5 thereof inserted into the apertures 4 present on the housing 2, thus effectively connecting an appliance to the mains electric supply. The arrangement within the housing is such that if the mains supply should fail the audible alarm comprised by the transducer behind the grille 8 will sound, the light visible through the aperture or transparent portion 9 will be illuminated, either with a continuous illumination or with a flashing illumination and the liquid crystal display 13 will be activated by a clock to provide an indication of the time elapsed since the power supply failed. When the power supply is re-connected, the audible alarm and the visible alarm will continue to operate, but the time displayed on the clock will be "frozen".

It will be appreciated that if the device is mounted in position as described above and a power failure occurs, a person present in the premises will receive an immediate visible and audible indication that a power failure has occurred and maybe thus be able to take appropriate action. If the person, however, was not present in the house when the power failure occurred, on returning to the house the person will hear the audible alarm and see the visible alarm, thus being aware that a power failure has occurred and by observing the display 13 will be able to ascertain precisely how long the power has been off.

When the power has been re-supplied, the person may press the "re-set" button 11 in order to switch off the visible alarm and the audible alarm, and in order to re-set the clock. A person may press the test button 10 to simulate a power failure to ensure that the device is operating satisfactorily.

Referring now to Figure 3, whilst there are, of course, many possible electric arrangements to provide the functions described above, one typical circuit is described by way of example.

The live and neutral terminal pins 3 present on the exterior of the housing 2 are connected to the input side 20 of a step-down transformer 21. The output side 22 of this transformer thus carries a reduced voltage. Of course, the voltage may be reduced in other ways, for example by means of a resistive potential divider.

The output of the transformer 21 is connected to a diode rectifier 23 of conventional design. However, any appropriate rectifier may be utilised. In the circuit illustrated, one output of the rectifier 24 is connected to earth and the other output 25 is connected to a power supply 26. The power supply 26 is effectively a rechargeable battery, which supplies a continuous predetermined potential to a positive rail 27. The arrangement is such that the battery is continually re-charged while the mains supply is present, but the battery supplies power, which will be needed to drive the audible and visible alarm and the clock, when the mains power supply has failed.

A normally closed switch 28 is connected in series with two resistances 29,30 between the output 25 of the

diode rectifier 23 and earth. A node 31 between the two resistors is connected to the base of a transistor 32, the controlled current path of which is connected between two resistors 33,34 which are connected in series between the positive rail 27 and earth. The node 35 between the resistor 33 and the transistor 32 is connected through a resistor 36 to the base of a second transistor 37, the controlled current path of which is connected in series between two resistors 38,39 which extend between the positive rail 27 and earth.

The node 40 between the transistor 37 and the resistor 39 is connected to the base of a further transistor 41, the controlled current path of which is connected in series between two resistors 42,43 which are connected between the positive rail 27 and earth. A node 44 between the transistor 37 and the resistor 43 is connected by means of a normally closed switch 45 to the base of the transistor 37 and is also connected to an audible alarm 46 and a visible alarm 47. The node 44 is also connected by means of a transistor 48 to a clock 49. The base of the transistor 48 is connected to the node 35 between the resistor 33 and the transistor 32. The node 44 is also connected to a re-set terminal present on the clock. The alarm, the light and the clock are also connected to the positive power supply rail 27.

It is to be appreciated that when the mains power supply is present, the mains voltage is stepped-down by the transformer 21 and is rectified by the rectifier 23. The rectified potential maintains the power level present in the battery in the power supply 26. Thus, the battery is constantly re-charged. However, when the mains supply is present, a potential is present at the node 31 between the resistors 29,30, thus keeping the transistor 32 switched

on. The value of the resistors 33 and 34 is such that when the transistor 32 is on there is only a low potential present at the node 35 which is not sufficient to switch on the transistor 37 nor sufficient to switch on the transistor 48. However, should the power supply fail the transistor 32 will effectively be switched off. The potential at node 35 will thus rise and become high. This potential is then sufficient to switch on the transistor 37. The values of the resistors 38 and 39 are so selected that when the transistor 37 is switched on the potential at node 40 rises to such an extent that the transistor 41 becomes switched on. The value of the resistors 42 and 43 is so selected that when the transistor 41 is switched on the potential at node 44 is sufficiently high to activate the alarm 46, the light 47 and, through the transistor 48, which is switched on because the potential at node 35 is high, the clock 49. Also, the high potential at node 44 is transferred through the normally closed switch 45 to the base of transistor 37, thus keeping transistor 37 switched on.

The alarm is such that when activated by a high signal from the node 44, the alarm provides an audible sound. This may be the audible sound from the transducer behind the grille 8 mentioned above or may comprise a bell or any other audible device.

The light 47 is so arranged that when activated by a high signal from the node 44, the light flashes or is otherwise visible.

The clock is such that when it receives a high potential from the node 44, through the transistor 48, the clock starts timing, in terms of hours and minutes, the time elapsed being shown on the display 13. The display 13

may display a time interval up to, for example, 24 hours and may then be adapted to "freeze" at a 24 hour time elapsed if the duration of the failure of the power supply is greater than 24 hours or the display may be adapted to display a time elapsed of up to 99 hours and 59 minutes.

When the power supply is restored the transistor 31 is again switched on, which will bring the node 34 to a low potential. However, because of the feed-back from node 44 to the base of transistor 37 through the normally closed switch 45, transistor 37 will be kept switched on and this in turn will keep transistor 41 switched on. Thus the alarm and the light will still continue to operate. However, because the potential at node 44 has fallen to a low potential the transistor 48 will be switched off and the clock will no longer be activated. The clock will thus "freeze" the time displayed on the display 13. When the re-set button 10 is pressed the normally closed switch 45 is opened.

If the re-set button 10 is pressed when the mains supply is on, the potential at the base of the transistor 37 will fall to a low potential thus switching off the transistor 37 and consequently also switching off the transistor 41. The alarm and the light will thus be deactivated since there is then a low potential on the node 44 and the clock is so designed that a low potential on the line 44 effectively serves to re-set the clock to zero.

If the switch 39 is opened, for example by pressing the "test" button 11, a power failure can be simulated since by opening the switch 39 the supply potential to the resistors 29,30 is terminated meaning that the node 31 will go low, thus switching off the transistor 32. After

pressing the test button 11 it will be necessary to press the re-set button 10. Thus the entire function of the device can be readily checked.

It is to be appreciated that whilst one embodiment of the invention has been described, and one possible circuit has been described, many alternatives will suggest themselves to those skilled in the art.

CLAIMS:

1. An alarm device, the device being adapted to be connected to an electric power supply providing power for an electric appliance, the alarm device comprising means to detect a failure of the mains power supply, and means to provide an alarm in the event of the failure of the power supply and means adapted to provide an indication of the duration of the failure of the power supply.
2. An alarm device, the alarm device comprising a housing, the housing being provided with protruding terminal pins adapted to be inserted into a main electric supply socket, the housing presenting apertures adapted to receive the terminal pins of a plug connected to an electric appliance, the arrangement being such that when the housing has the terminal pins thereof inserted into a mains electric socket and a plug connected to an electric appliance has the terminal pins thereof inserted in the apertures in the housing, the appliance is connected to the mains electric supply, the housing containing means adapted to respond to the failure of the mains electric supply to activate an alarm present within the housing.
3. A device according to Claim 2 wherein the alarm is an audible alarm.
4. A device according to Claim 2 or 3 when the alarm is a visible alarm.
5. A device according to Claim 4 wherein the alarm is a flashing light.

6. A device according to any one of Claims 2 to 5 wherein the alarm includes means adapted to provide a display of the time for which the power supply has been interrupted.

7. A device according to any one of Claims 2 to 6 provided with a re-set button adapted to terminate operation of the alarm and/or to re-set the time display.

8. A device according to any one of Claims 2 to 7 where the housing contains a battery adapted to provide power for the alarm and the time display.

9. A device according to Claim 8 wherein the battery is rechargeable directly from the mains supply.

10. A device according to any one of the preceding Claims provided with means to test the operation of the alarm by simulating a power failure.

11. An alarm device substantially as herein described with reference to and as shown in the accompanying drawings.

12. Any novel feature or combination of features disclosed herein.

Relevant Technical fields

(i) UK CI (Edition K) H2K (KDX, KDA)
G4N (NDR)

(ii) Int CL (Edition 5) G01R (19/165)

Search Examiner

D J HARRIS

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

17 JUNE 1992

Documents considered relevant following a search in respect of claims

1, 10 AND 11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1446780 A (GAMMA) Page 1 lines 25-31 Page 3 lines 65-78	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

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